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DODPOPHM/USA/DOD/NADTR91100

PERFORMANCE ORIENTED PACKAGING TESTING
OF
CNU-405/E SHIPPING AND STORAGE CONTAINER
FOR
PACKING GROUP II
SOLID HAZARDOUS MATERIALS

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<p>Qualification tests were performed to determine whether the reusable CNU-405/E Shipping and Storage Container meets the Performance Oriented Packaging (POP) requirements specified by the United Nations Recommendations on the Transportation of Dangerous Goods. The container loaded to a gross weight of 128 pounds successfully met the requirements and retained its contents throughout the tests.</p>					
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INTRODUCTION

The CNU-405/E Shipping and Storage Container with a dummy load of 100 pounds enclosed and an overall weight of 128 pounds was tested to ascertain whether this standard container would meet the requirements of Performance Oriented Packaging (POP) as specified by the United Nations (UN) Recommendation on the Transportation of Dangerous Goods, Document ST/SG/AC.10/1, Revision 6, Chapters 4 and 9. A Base Level Vibration Test was also conducted in accordance with the proposed rulings specified in the Department of Transportation's (DOT) Performance Oriented Packaging Standards HM-181, and Requirements for Explosives HM-181A. The objectives were to evaluate the adequacy of the container in protecting explosive materials which are secured with appropriate dunnage.

TESTS PERFORMED

1. Stacking Test

This test was performed in accordance with ST/SG/AC.10/1, Chapter 9, Paragraph 9.7.6. Three different containers were used, and subjected to a stack weight of 1,200 pounds. The test was performed for 24 hours. After the allowed time, the weight was removed and the containers examined. Any leakage, deterioration, or distortion which could adversely affect transport, reduce strength or cause instability in stacks of packages was considered cause for rejection.

2. Drop Test

This test was performed in accordance with ST/SG/AC.10/1 Chapter 9, Paragraph 9.7.3. One of the three containers used during the stacking test was also used for the four flat drops and one corner drop instead of the required five containers (one for each drop). The drops were performed from a height of 4 feet in the following sequence:

- a. Flat Bottom
- b. Flat Top
- c. Flat on Long Side
- d. Flat on Short Side
- e. One Corner

This test was performed at ambient, $+70 \pm 20$ °F temperature. The contents of the container should be retained within its packaging and exhibit no damage liable to affect safety during transport.

3. Base Level Vibration Test

This test was performed in accordance with Appendix C of Federal Register / Vol 52, No 215 / Friday, November 6, 1987 / Proposed Rules. Three sample containers were filled to a gross weight of 128 pounds and closed for shipment using nonhazardous materials. One container was loaded with simulated brass weights used during the drop test. One container was loaded with 1 pound steel bars and the other container was loaded with the required weight of sand which would be the worst case scenario. The three containers were placed on a vibrating platform that had a vertical amplitude (peak-to-peak displacement) of one inch. The containers were not restrained during vibration except by a fence attached to the test surface to prevent them from falling off the table. The containers were tested for 60 minutes in their normal shipping position. The vibratory input to the container was at a frequency that caused the container to be raised from the vibrating platform to such a degree that a piece of material of approximately 1/16" (1.6mm) thickness could be passed between the bottom of the container and the platform.

PASS/FAIL (UN CRITERIA)

The criteria for passing the stacking test is outlined in Paragraph 9.7.6.3 of ST/SG/AC.10/1 and states the following: "No test sample should show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages".

The criteria for passing the drop test is outlined in Paragraph 9.7.3.5 of ST/SG/AC.10/1 and states the following: "Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by an inner packaging or inner receptacle (e.g., a plastic bag), even if the closure is no longer sift-proof".

PASS/FAIL (HM-181 CRITERIA)

The criteria for passing the Base Level Vibration Test is outlined in Part 173 Appendix C Paragraphs 4 and 5, Docket No. HM-181, Notice No. 87-4, Federal Register / Vol 52, No. 215 / Friday, November 6, 1987 / Proposed Rules and states the following: "Immediately following the period of vibration, each package shall be removed from the platform, turned on its side and observed for any evidence of leakage. Rupture or leakage from any of the packages constitutes failure of the test".

TEST RESULTS

1. Stacking Test

Satisfactory.

2. Drop Test

Satisfactory, see Figure 1.

3. Base Level Vibration Test

Satisfactory with no leakage.

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DISCUSSION

1. Stacking Test

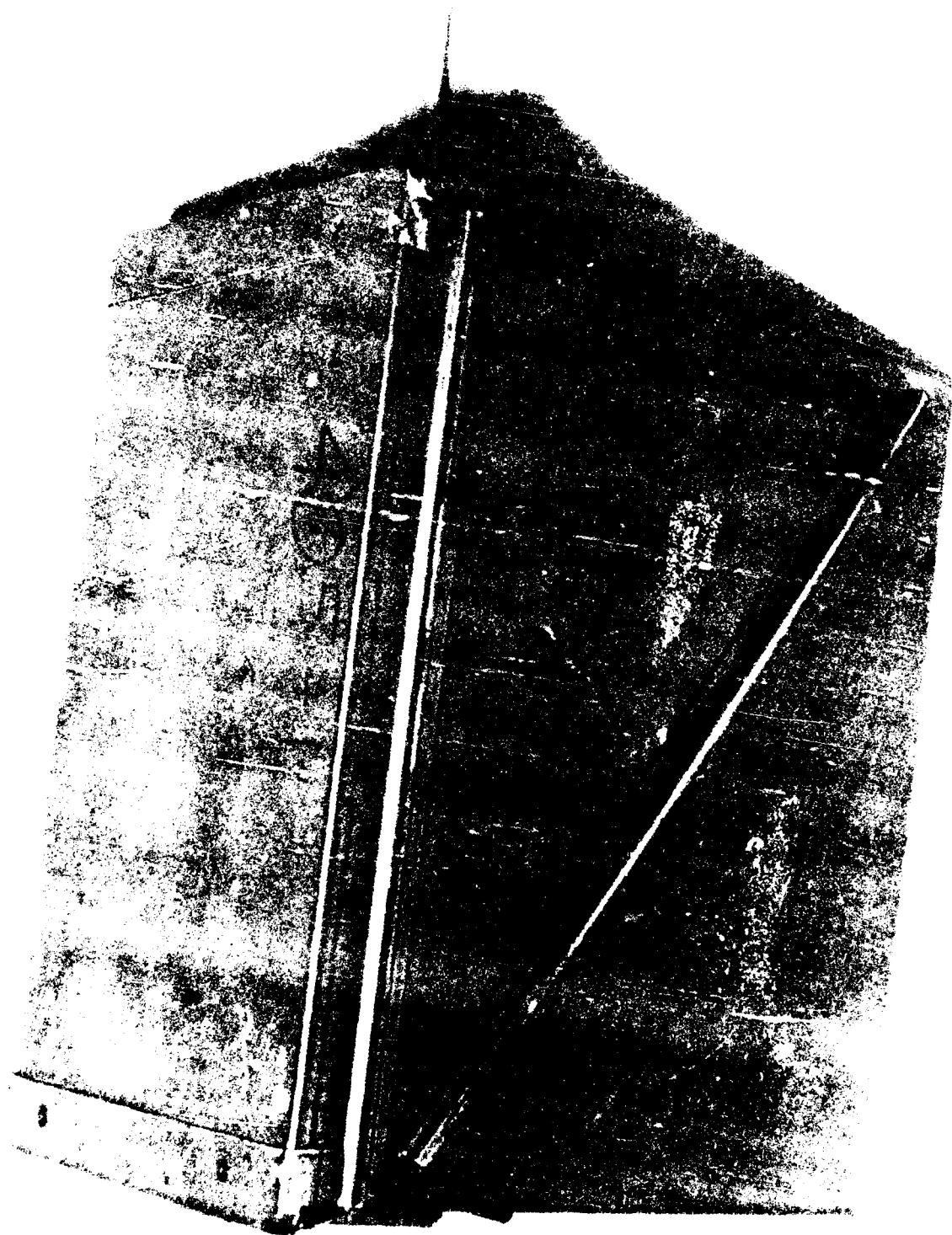
The stacking test was performed with a load of 1200 pounds for 24 hours. Each container was visibly checked after the 24 hour period was over. There was no leakage, distortion, or deterioration to any of the containers as a result of this test.

2. Drop Test

After each drop, the container was inspected for any damage which would be a cause for rejection. Final inspection indicated damage was minimal with only minor denting noted, particularly after the final corner drop. The container remained intact and serviceable on completion of the tests. The standard wire seal (Drawing 19200-8794342) used to secure each end of the container also remained intact during the entire test. An internal pressure test at the end of the series of drops was conducted and the container still maintained an internal pressure of 2.25 PSIG for 30 minutes.

3. Base Level Vibration Test

Immediately after the vibration test was completed, each container was removed from the platform, turned on its side and observed for any evidence of leakage. The latches remained intact, the seals were not broken, and there was no evidence of leakage of the solid weights, steel bars, or the sand.



REFERENCE MATERIAL

United Nations "Recommendation on the Transportation of Dangerous Goods", ST/SG/AC.10/1, Revision 6

Docket No. HM-181, Notice No. 87-4, Federal Register / Vol 52, No 215 / Friday, November 6, 1987 / Performance-Oriented Packaging Standards; Proposed Rule making.

Docket No HM-181A; Notice No 90-5, Federal Register/ Vol. 55, No 85 / Wednesday May 2, 1990 / Requirements for Explosives ; Proposed Rule making

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TEST DATA SHEET

Container: CNU-405/E SHIPPING AND STORAGE CONTAINER	
Type: 4A1	UN Code: See Table
Specification Number: NAVAIRSYSCOM DWG 986AS106	Material: Steel
Capacity: 58 kg (128 pounds)	Dimensions: .47 m (L) x .27 m (W) x .37m(H) (18.59" L x 10.59" W x 14.59" H)
Closure (Method/type): Removable lid	Tare Weight: 10.17 kg (22.45 pounds)
Additional Description: 25 MM SHIPPING AND STORAGE CONTAINER	

PRODUCT(S): See Table	
Name: See Table	
United Nations Numbers: 0267, 0321, 0339, 0417	
United Nations Packing Group: II	
Physical State: Solid	
Vapor Pressure (Liquids Only): N/A At 50°C: N/A At 55°C: N/A	
Consistency/Viscosity: N/A Density/Specific Gravity: N/A	
Amount Per Container: See Table	
Net Weight: See Table	

TEST PRODUCT:	
Name: Simulated Weights of Metals (Brass or Steel) or Granular sand	Physical State: Solid
Size : Brass 9.88" x 7.75" x 1.25" or Steel .88" Diameter x 6.0"	Quantity : Brass Four (4) or Steel 100 rods or Sand 100 lbs.
Density/Specific Gravity: N/A	
Dunnage: PPP-C-1752 FOAM POLYETHYLENE	
Gross Weight: 58 KG (128 lbs.)	

TABLE I

DODIC OR NALC	NSN	HM ITEM	TYPE	PACKING DWG	HAZARD CLASS	UN NO.	PER CNTR #	WGT KG
A974	1305-01-209-5915	25MM	M791	5167214	1.4C	339	55	44.7
A975	1305-01-212-8360	25MM	M792	5167214	1.2(04)E	0321	55	44.7
A976	1305-01-212-5066	25MM	M793	5167214	1.4C	0417	55	44.7
A978	1305-01-210-6802	25MM	PGU23			0339	100	58.0
A978	1305-01-250-0101	25MM	PGU23			0339	80	57.7
A979	1305-01-251-2582	25MM	PGU20			0339	80	57.7
A979	1305-01-251-3623	25MM	PGU20			0339	80	57.7
A981	1305-01-213-2581	25MM	MK210	5167214		0321	55	44.7
A981	1305-01-271-7782	25MM				0321		
A982	1305-01-199-6737	25MM	PGU25			0321	100	58.0
A982	1305-01-250-0100	25MM	PGU25			0321	80	
A982	1305-01-270-2318	25MM				0321		
MM55	1375-01-327-9204	DET	MK120	6705206-1	1.4B	0267	12	17.1
MM56	1375-01-327-9205	DET	MK123	6705307-1	1.4B	0267	8	18.4
MM57	1375-01-327-9206	DET	MK126	6705313-1	1.4B	0267	1	19.4
MM58	1375-01-328-5813	DET	MK121	6705312-1	1.4B	0267	2	19.7
MM59	1375-01-328-4733	DET	MK122	6705306-2	1.4B	0267	12	17.1
MM60	1375-01-328-4734	DET	MK124	6705307-2	1.4B	0267	8	18.4
MM61	1375-01-328-4735	DET	MK125	6705313-2	1.4B	0267	1	19.4
MM62	1375-01-328-4736	DET	MK127	6705312-2	1.4B	0267	2	19.6